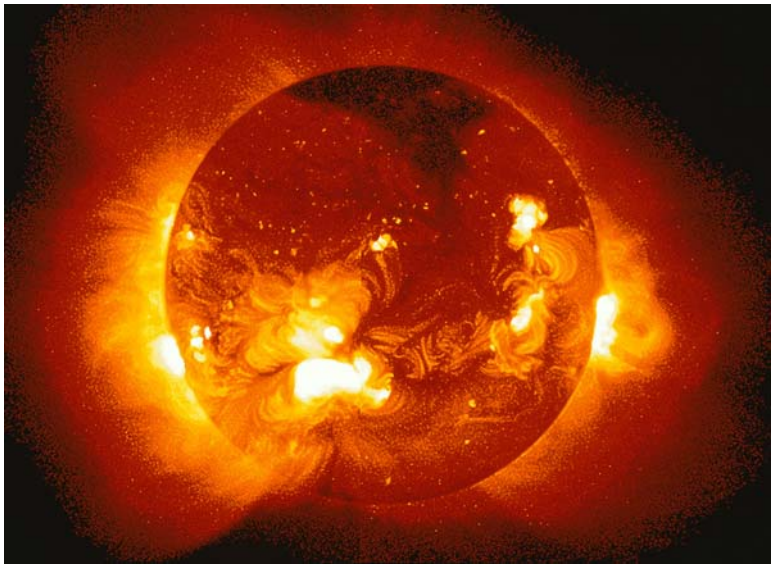

SPACE WEATHER

Space Weather research areas include geomagnetism, space weather modeling, and operational assessments of system impacts due to Space Weather. Recent and ongoing research has included validation efforts for several state-of-the-art space weather computer models of the magnetosphere-ionosphere system. In addition, a Windows-based code to compute indices of geomagnetic activity using a new technique has been validated and applied to a newly operational magnetometer site in Northern Utah. Finally, we have validated and characterized space weather data collected by the Defense Meteorological Satellite Program (DMSP). The results of this work will greatly benefit the next generation of space weather prediction models, which will rely heavily on an "artificially intelligent" combination of observations and physics-based codes. Current work includes an analysis of solar wind, geomagnetic, and ionospheric data in order to better understand the electrodynamics of geomagnetic storms. Such knowledge will significantly improve our ability to safeguard vital DoD assets including communications systems, radars, and manned spaceflight operations. In addition, we are examining the threshold plasma parameters that signal the onset of harmful electrical charging for high-altitude spacecraft. This will provide the warfighter with crucial information concerning the operational capability of space platforms.

A suite of Silicon Graphics computers, including four O2s, three dual-processor Octanes, and three SUN workstations, are available through our new space weather lab to design and test space plasma computer models. For larger computational requirements, there is a close collaboration between the Air Force Institute of Technology and the world-class ASC Major Shared Resource Center, providing access to state-of-the-art parallel processing capabilities and high-end visualization tools. Finally, access to the Air Force Research Lab's large space weather observational database (both satellite- and ground-based) provides an extensive benchmarking and validation capability.

FACULTY:

Bailey, William F.
Associate Professor of Physics
B.S., United States Military Academy, 1964; M.S., The Ohio State University, 1966; Ph.D., AF Institute of Technology, 1978. Transport properties in weakly ionized and reactive gas mixtures with applications to space environmental modeling, semiconductor processing, and thermionic energy conversion.

Della-Rose, Devin J.
Assistant Professor of Atmospheric Physics
B.S., Physics, Texas Christian University, 1985; B.S., Meteorology, Penn State University, 1987; M.S., Physics, Utah State University, 1992; Ph.D., Physics, Utah State University, 1999. Space environment modeling,

ionospheric electrodynamics, geomagnetism, solar-terrestrial relations, and space environmental effects on Air Force systems.

Groves, Clark M.
Assistant Professor of Atmospheric Physics
B.S., Meteorology, University of Arizona, 1991; M.S., Physics, AF Institute of Technology, 1995; Ph.D., Physics, Utah State University, 2002. Ionospheric and magnetospheric simulation and visualization, ionospheric electrodynamics, solar-terrestrial relations, and space weather effects on Air Force systems.

Weeks, David E.
Assistant Professor of Physics
B. A. , Colgate University, 1983; M. S. , Georgia Institute of Technology, 1985; Ph.D. , University of Arkansas, 1989. Modeling of magnetosphere, computer simulations, molecular reaction dynamics.

Wolf, Paul J.
Associate Professor of Physics
B.S. Regis College, 1978; M.S. Air Force Institute of technology, 1979; PhD, Air Force Institute of Technology, 1985. Molecular and atomic spectroscopy, thin film deposition using laser ablation techniques, gas phase chemical and collisional kinetics, energy transfer processes in small molecules.

SOME RECENT PUBLICATIONS:

"Spacecraft Charging at Geosynchronous Altitudes: New Evidence of the Existence of Critical Temperature," Journal of Spacecraft and Rockets, 38: 922-928 (Nov-Dec 2001), Lai, S. T., and Della-Rose, D. J.

"Driving the High-Latitude Ionosphere with Variable Time Resolution "K-Like" Geomagnetic Indices," Journal of Atmospheric and Solar-Terrestrial Physics, 62: 773-786 (June 2000), Della-Rose, Devin J., Jan Sojka, Lie Zhu, Robert Schunk, and Michael David.

"Numerical Solutions to the Spatially Inhomogeneous Boltzmann Equation," Spring Meeting of the Ohio Section of the American Physical Society at the Kettering University, Flint, Michigan, April 1999, C. G. Smithtro and Wm. F. Bailey.

"The Influence of Electron Temperature Variations on Shock Structure in a Glow Discharge," Spring Meeting of the Ohio Section of the American Physical Society at the Kettering University, Flint, Michigan, April 1999, S. L. Walker and Wm. F. Bailey.

"Influence of a Geometrically Induced Space Charge on the Electron Energy Distribution Function," Spring Meeting of the Ohio Section of the American Physical Society at the Kettering University, Flint, Michigan, April 1999, F. A. Tersigni and Wm. F. Bailey.

"Solutions to the Spatially Inhomogeneous Boltzmann Equation in Rare Gases and Rare Gas-Molecular Gas Mixtures," 52nd Annual Gaseous Electronics Conference, October 1999 in Madison Wisconsin, C. G. Smithtro and Wm. F. Bailey.

"Resolving geomagnetic disturbances using "K-like" geomagnetic indices with variable time intervals," Journal of Atmospheric and Solar-Terrestrial Physics, 61: 1179-1194 (October 1999), Della-Rose, Devin J., Jan Sojka, and Lie Zhu.

"Ionization mechanisms in CRRES chemical releases: 1. In situ measurements and model results," J. Geophysical Research, 103 (A1), 457-470, 1998, D.E. Hunton, P.J. Wolf, and T.M. Shadid.

"Ionization mechanisms in CRRES chemical releases: 2. Strontium photoionization and Ba+/Sr+ collisional ionization cross section calculations," Geophysical Research, 103 (A1), 447-455, 1998, P.J. Wolf and D.E. Hunton.